Journal of Positive School Psychology http://journalppw.com
2022, Vol. 6, No. 3, 6716– 6729

Effectiveness of qigong in improving blood lipids in patients with cardiovascular disease: a systematic review and meta-analysis

[1]Mengyao Chao, [2]Meng Ding, [1]Xiaoming Yang, [1*]Tengku Fadilah Tengku Kamalden

[1]*Department of Sport Studies, Faculty of Educational Studies, Universiti Putra Malaysia,43400 UPM Serdang, Selangor Malaysia,*
[2]*College of Physical Education, Shandong Normal University, 250014 Jinan, China;*
Corresponding author: tengku@upm.edu.my

Abstract

Background: Dyslipidemia is a major risk factor for cardiovascular disease, and numerous studies have demonstrated that controlling dyslipidemia can reduce hospitalization and mortality rates, and thus improve survival. Qigong is widely used as an effective complementary and alternative therapy.

Methods: A comprehensive search of PubMed, MEDLINE, CNKI, VIP, Cochrane Library, Web of Science, EMBASE, and WanFang data databases was performed. The methodological quality of the included studies was evaluated using the Cochrane risk-assessment tool. Meta-analysis was performed using the Review Manage 5.4 software.

Results: Twenty-five randomized controlled trials including 1654 patients with cardiovascular disease were included. The results showed that qigong, compared with no exercise, significantly reduced TG (MD= -0.39, 95% CI [-0.65, -0.14], P =0.003) and LDL-C (MD= -0.68, 95% CI [-0.91, -0.45], P < 0.00001), TC (MD= -0.12, 95% CI [-0.32, 0.08], P = 0.23) and HDL-C (MD = 0.13, 95% CI [0.04, 0.22], P=0.005) were not significantly different. There was no statistically significant difference between the qigong and the other exercises.

Conclusion: Qigong had a significant positive effect on lipid levels in patients with cardiovascular disease. The most significant effects were TG and LDL-C; although TC and HDL-C were not significantly improved, there were still positive effects.

Keywords: Qigong, Cardiovascular disease, Lipid, Systematic review, Meta-analysis.

1. INTRODUCTION

Cardiovascular disease is a major public health threat to humans, claiming an estimated 17.9 million lives annually[1]. Dyslipidemia is a major risk factor for CVD and is an abnormality in the metabolism of lipoproteins in the body, mainly total cholesterol(TC), low-density lipoprotein cholesterol(LDL-C), elevated triglycerides(TG), and reduced high-density lipoprotein cholesterol(HDL-C). Dyslipidemia is one of the most important factors contributing to atherosclerosis and is an independent risk factor for coronary heart disease and ischemic stroke. Effective control of dyslipidemia has been shown to reduce hospitalization, mortality, and survival rates [2].

Currently, pharmacological and surgical treatments for CVD have limited effectiveness and do not significantly improve the physical and mental health and quality of life of patients[3]. Studies have shown that aerobic exercise can promote vasoconstriction, dilute blood viscosity, improve blood circulation, and promote whole-body function of moving at the same time to form a cycle cycle. Therefore, maintaining regular exercise improves cardiovascular diseases [4].

Qigong, a traditional Chinese sport, mainly includes Baduanjin, Wuqinxi, Liuzijue, and Yijinjing [5]. As an active therapy, qigong is practiced in a gentle and soothing manner, which relaxes muscles and regulates qi and blood [6]. It is an effective complementary and alternative medical therapy for people with cardiovascular diseases [7].

Some studies on the effects of qigong interventions on blood lipids concluded that qigong was effective in improving blood lipid levels in healthy adults [8]. However, no significant effects have been observed in patients with chronic diseases [9]. The latest study concluded that qigong has good preventive and therapeutic effects in patients with hyperlipidemia [10]. Some studies have concluded that qigong can reduce TG, but there is no statistically significant effect on other blood lipid indices [11]. Some studies have concluded that qigong can significantly improve the four blood lipids [12-14]. Therefore, our study aimed to further confirm the effect of qigong on lipids in patients with CVD and to provide favorable guidance for future studies.

2. Methods

Objectives.

The purpose of this evaluation was to study the effect of qigong on four blood lipid parameters in patients with CVD. A meta-analysis was used to explore the improvement effect of fitness qigong on patients with cardiovascular disease under different conditions.

Design.

A systematic review and meta-analysis of the included randomized controlled trials in English and Chinese regarding studies of qigong to improve blood lipids in patients with CVD was performed according to the guidelines provided by the Cochrane Collaboration[15].

Search Methods.

“Qigong, Cardiovascular disease, blood lipid" was used as the theme, and the Chinese literature was searched in CNKI and Wanfang databases. English literature was searched in the Cochrane Library, PubMed, Web of Science, Elsevier, and MEDLINE. Search strategy: (qigong, baduanjin, yijinjing, or daoyingong), (cardiovascular disease), and (blood lipid). The search period was from January 2000 to February 2022, and references from the studies were retrospectively included to supplement the relevant literature.

Inclusion Criteria.

(1) Subjects included patients with cardiovascular disease and no other comorbidities. (2) The experimental group used any type of Qigong as an intervention. (3) No exercise or other aerobic exercise was performed in the control group. (4) Randomized controlled trials. (5) At least one blood lipid index was included.

Exclusion Criteria.

(1) There are no clearly reported data on the outcome indicators. (2) Non-randomized controlled trials or no control group. (3) Systematic evaluation or conference-type papers. (4) Exercise intervention was not qigong. (5) The intervention duration was not continuous.

Search Outcome.

A total of 25 randomized controlled trials met the inclusion criteria for this study. A comprehensive search of PubMed, MEDLINE, CNKI, VIP, Cochrane Library, Web of Science, EMBASE, and WanFang Data databases was initially conducted by two researchers. A total of 313 studies on the four indicators of qigong and blood lipid levels were retrieved. Subsequently, the relevant literature retrieved was screened according to the inclusion and exclusion criteria. After removing duplicate studies, 219 publications were retained. After reading titles and abstracts, 44 studies were retained. Finally, 25 relevant studies were included after reading the full text (Figure 1).

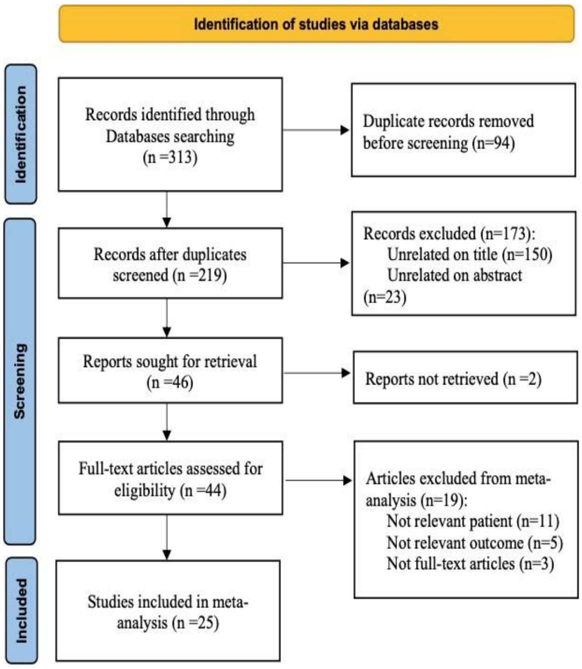


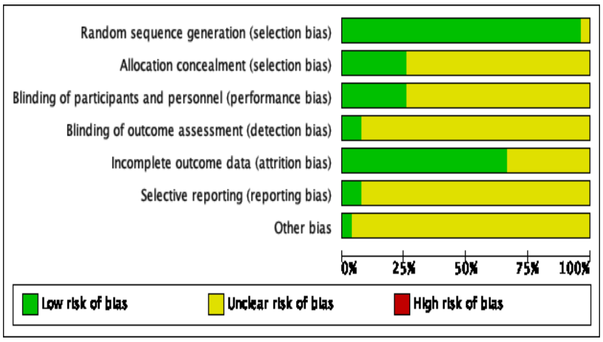
Figure 1: *PRISMA Flow Diagram of study selection and identification*

Data Extraction.

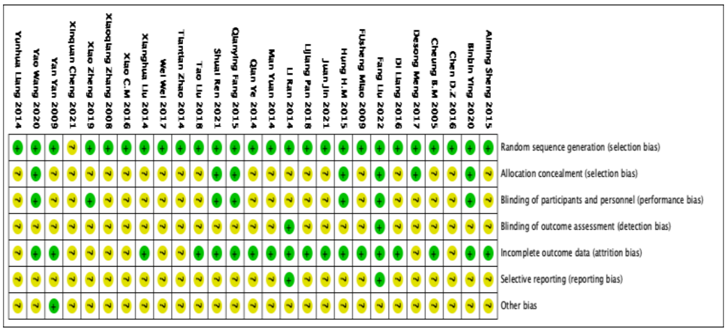
Three researchers were involved in data extraction. Two researchers extracted the data and analyzed the included papers separately, and any doubts or different results emerged during the process by discussing with the third researcher to determine the results. The characteristics of the extracted papers were as follows: first author, time of publication, patient condition and age, and intervention. The extracted data included sample size, trial intervention period, and TC, TG, HDL-C, and LDL-C levels.

Quality Appraisal.

The methodological quality of the included studies was evaluated using the Cochrane Risk Assessment Tool[15] , for selection bias, performance bias, detection bias, attrition bias, reporting bias, and other biases. Low-risk, high-risk, and unclear were used to score the quality of the included literature. All studies were assessed as low-risk and none as high-risk. Most studies were rated as unclear because they did not describe detailed blinding. The evaluation results are shown in Figure 2.



(a)



(b)

Figure 2. *Risk of bias graph(a) and Risk of bias summary(b)*

Statistical Analysis.

The combined effects analysis was performed using Review Manager version 5.4. When P<0.05, there was a significant difference between the experimental and control groups, demonstrating that the results of the meta-analysis were statistically significant. The literature was tested for heterogeneity using the X2 test and I2 statistic, and a fixed-effects model was used when P>0.1 and I2<50%, P<0.1 and I2>50%. A random-effects model was used for analysis. The reasons for the heterogeneity were explored using subgroup and sensitivity analyses. Subgroup analysis was performed for studies on different types of diseases to explore the effect of qigong on patients with different types of cardiovascular disease.

3. Results

Characteristics of the Included Studies

A total of 25 randomized controlled trials on lipids in patients with qigong and cardiovascular disease were included, including 1654 samples (Table 1). The included studies were conducted from 2008 to 2021. There were seven studies on patients with diabetes[16-22],five studies each on patients with hypertension [23-27] and hyperlipidemia [28-32]. and four studies on patients with metabolic syndrome [33-36] and cardiovascular disease risk [37-40]. The ages of the participants ranged from 32 to 74 years. The longest period of supervision was 13 months and the shortest was 2 weeks. Patients exercised on average 5 days per week for 59 min each time. A variety of intervention forms were used in the experimental group, with most studies using Baduanjin as an intervention. Three each used Daoyinsgong and Yijinjing as interventions and two used Wuqinxi. One each used Liuzijue and Guolin Qigong, and two did not report the qigong forms. In addition, two studies compared Qigong with other exercises, and the means used in the control group were walking [25] and resistance training [24].

Table 1. *Characteristic of randomized controlled trials included studies*

First author, Year	Participants		Age	Intervention		Supervision time
	total, E/C	Patients	E/C Mean (SD)	E	C	Per session, per week, duration
Yao W. 2020	77,38/39	DM	49.34(12.65)/49.95(14.37)	baduanjin	N	40min, 4days, 3/6months
Juan J. 2021	90,45/45	MS	69.7(11.2)/61.3(10.6)	baduanjin	N	30min, 7days, 3months
Shuai R. 2021	40,20/20	DM	49.8(2,46)/49.5(2.69)	baduanjin	N	60min, 7days, 4months
Xinquan C. 2021	160,80/80	MS	≥65	baduanjin	N	50min, 4days, 13months
Fang L. 2022	25,13/12	stroke	57.71(9.03)/59.12(8.6)	liuzijue	N	24min, 7days, 3months
Xiao Z. 2019	40,20/20	T2DM	60~74	qigong	N	45min, 3days, 3months
Binbin Y. 2020	40,20/20	T2DM	61.4	daoyingong	N	50min, 3days, 3months
Qianying F. 2015	170,85/85	stroke	60.53(6.29)/59.75(6.34)	baduanjin	N	60min, 5days, 3months
Di L. 2016	60,30/30	HLP	NR	baduanjin	N	60min, 6days, 3months
Yunhua L. 2014	60,30/30	HTN	54.8(7.6)/55.7(8.8)	baduanjin	WK	40min, 5days, 6months
Tao L. 2018	40,20/20	T2DM	57.2(5.4)	baduanjin	N	90min, 6days, 6months
Xianghua L. 2014	35,20/15	HTN	52.35(5.57)/50.07(6.44)	baduanjin	N	30min,4days, 18weeks
Desong M. 2017	24,12/12	T2DM	40~60	yijinjing	N	60min, 3days, 3months
Fusheng M. 2009	50,25/25	HLP	63.32(6.35)/63.68(6.8)	baduanjin	N	55min, 6days, 18months
Wei W. 2017	40,20/20	MS	45.2(4.4)	baduanjin	N	45min, 6days, 6months
Yan Y. 2009	62,31/31	HLP	52.6(8.7)	wuqinxi	N	60min, 7days, 6months
Qian Y. 2014	60,30/30	HLP	50.79(4.01)/49.83(2.91)	yijinjing	N	30min, 5days, 6months
Man Y. 2014	60,30/30	HLP	50.93(3.95)/49.93(2.91)	Yijinjing	N	30min, 5days, 6months
Chen,D.Z 2016	60,30/30	HTN	66.3(5.8)	Daoyinshu	N	44min, 5days, 6months

Aiming S. 2015	114,48/56	CVD	35~59	Wuqinxi	N	60min, 5days, 12months
Cheung,B.M 2005	91,47/44	HTN	57.2(9.5)/51.2(7.4)	guolin qigong	RE	60min, 7days, 4months
Hung,H.M 2009	145,84/61	CVD	62.05(10.54)/59.34(9.23)	qigong	N	60min, 3days, 3months
Xiao,C.M 2016	48,24/24	HTN	65.6(7.8)	Baduanjin	N	40min, 5days, 6months
Xiaoqiang Z. 2008	23,13/10	MS	41(5.61)/40.9(4.82)	baduanjin	N	55min, 5days, 10months
Tiantian Z. 2014	40,20/20	T2DM	65.55(6.23)/61.90(7.07)	daoyinshu	N	60min, 3days, 12months

EG:experimental group, CG:control group, N:no exercises, NR:not reported, RT:resistance training, RE:regular exercise, WK:walking, DM:diabetes mellitus, T2DM:type 2 diabetes mellitus, HTN:hypertension, HLP:hyperlipidmia, MS:metabolic syndrone, CVD:cardiovascular disease, min:minute

Outcomes

Qigong versus No ExerciseTotal

Cholesterol

There were 21 randomized controlled trials reported total cholesterol, with 642 and 613 members in the qigong and no exercise group. Combining the data revealed a high expression of heterogeneity (P<0.00001; I2=93%); therefore, a random-effects model was used for meta-analysis. Studies that resulted in excessive heterogeneity were excluded by sensitivity analysis[19 27 29 32 39 40], The final meta-analysis was performed on 15 studies and includes 789 subjects[16-23 25 30 31 34-36 38]. There was no significant difference between the Qigong and no exercise groups (MD = -0.12, 95% CI [-0.32,0.08], P = 0.23) (Figure 3). The subgroup analysis showed that the largest number of studies reported TC in patients with diabetes, and the analysis was consistent with the overall results (P = 0.13). However, the differences between groups in the analysis of patients with hypertension and hyperlipidemia showed significant differences. Because only two studies were included in each group, the outcomes of the subgroup analysis were considered unstable.

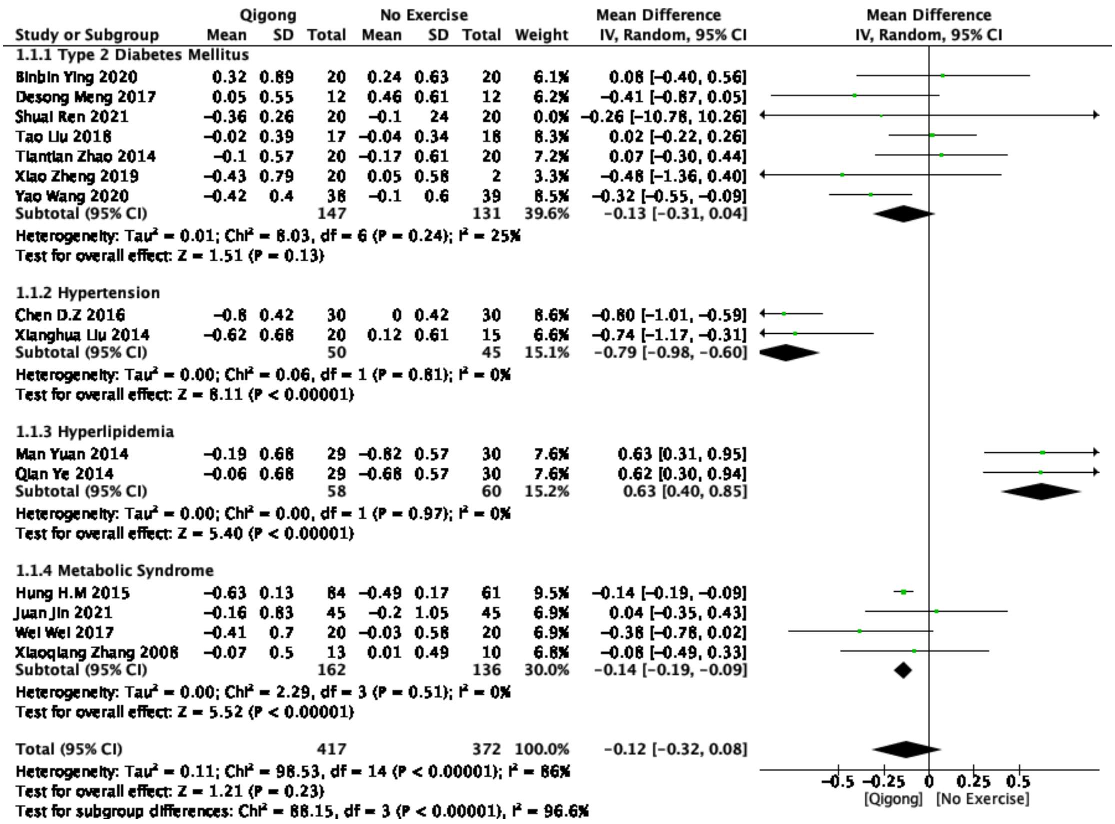


Figure 3. *The meta-analysis for comparing TC between the Qigong and No exercise group*

Triglycerides

Twenty-three randomized controlled trials on TG were conducted, with 783 and 754 subjects in the qigong and no exercise group. Data were combined and found to have high heterogeneity (P<0.00001; I2=96%), a random-effects model was used for the meta-analysis. Six studies [27-29 32 33 36] that resulted in excessive heterogeneity were excluded by sensitivity analysis. Finally, the results of 16 studies (n=1034)[16-23 25 30 31 34 35 37-39] showed significant differences between qigong and no exercise groups (MD= -0.39, 95% CI [-0.65, -0.14], P = 0.003), qigong is effective in reducing TG in patients with CVD (Figure 4).However, the subgroup analysis showed no statistically significant in patients with hyperlipidemia (P = 0.23) or stroke (P = 0.42).

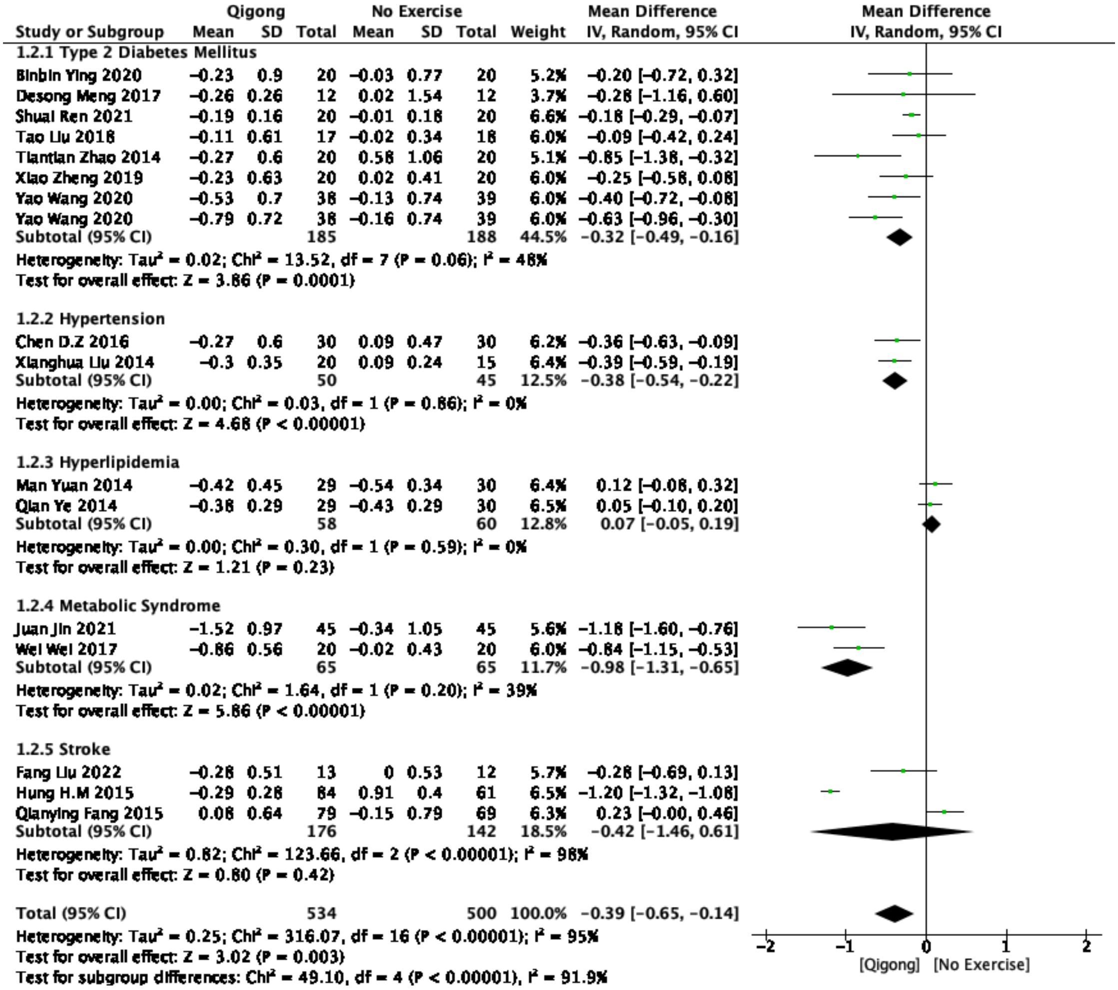


Figure 4. *The meta-analysis for comparing TG between the qigong and no exercise group*

High-density lipoprotein Cholesterol

Twenty studies reported data on HDL-C (n=1282). The combined heterogeneity was too high ($P<0.00001$; I2=94%) , which was analyzed using a random effects model. Two major sources of heterogeneity were excluded by sensitivity analysis[29 36]. Finally, a total of 17 studies were included (n=1109)[16-23 27 30-32 34 35 37-39]. The results in Figure 5 show that the intervention of qigong on HDL-C was not statistically significant(MD=0.13, 95% CI [0.04, 0.22], P=0.005). Likewise, there were no significant differences between subgroups.

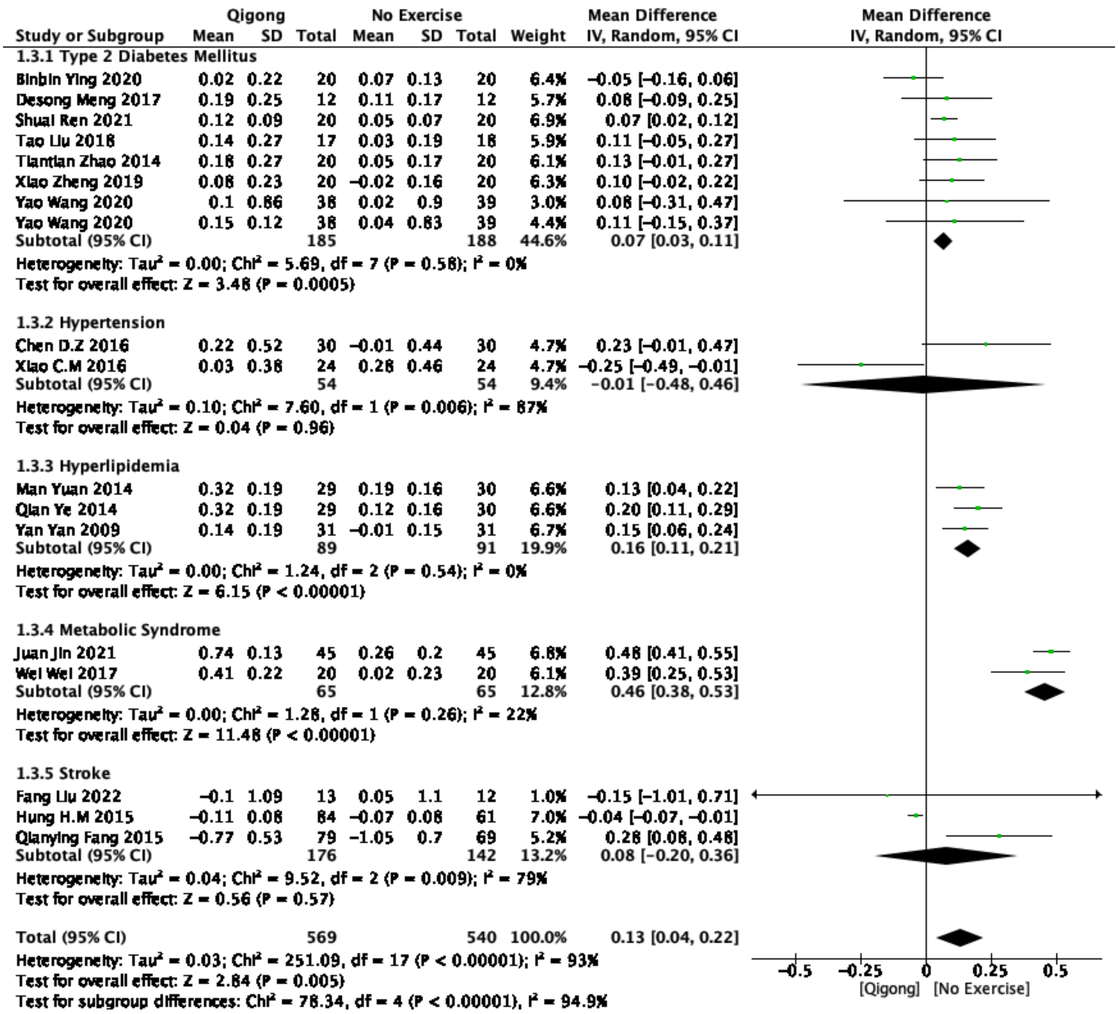


Figure 5. *The meta-analysis for comparing HDL-C between the qigong and no exercise group*

Low-density lipoprotein Cholesterol

Nineteen studies (n=1174) reported data on LDL-C, and the combined data revealed excessive heterogeneity (P<0.00001; I2=96%); therefore, a random-effects model was used for the meta-analysis. Sensitivity analysis excluded 3 studies that caused excessive heterogeneity [16 19 32]. However, the heterogeneity could not be reduced by sensitivity analysis between the data of the included studies in patients with hyperlipidemia, metabolic syndrome, and stroke. Finally, the analysis of the combined data from 16 studies (n=923) yielded (Figure 6)[17 18 20-23 27 29-31 34-39] that qigong was able to reduce LDL-C levels in patients with cardiovascular disease (MD= -0.68, 95% CI [-0.91, -0.45], P < 0.00001).

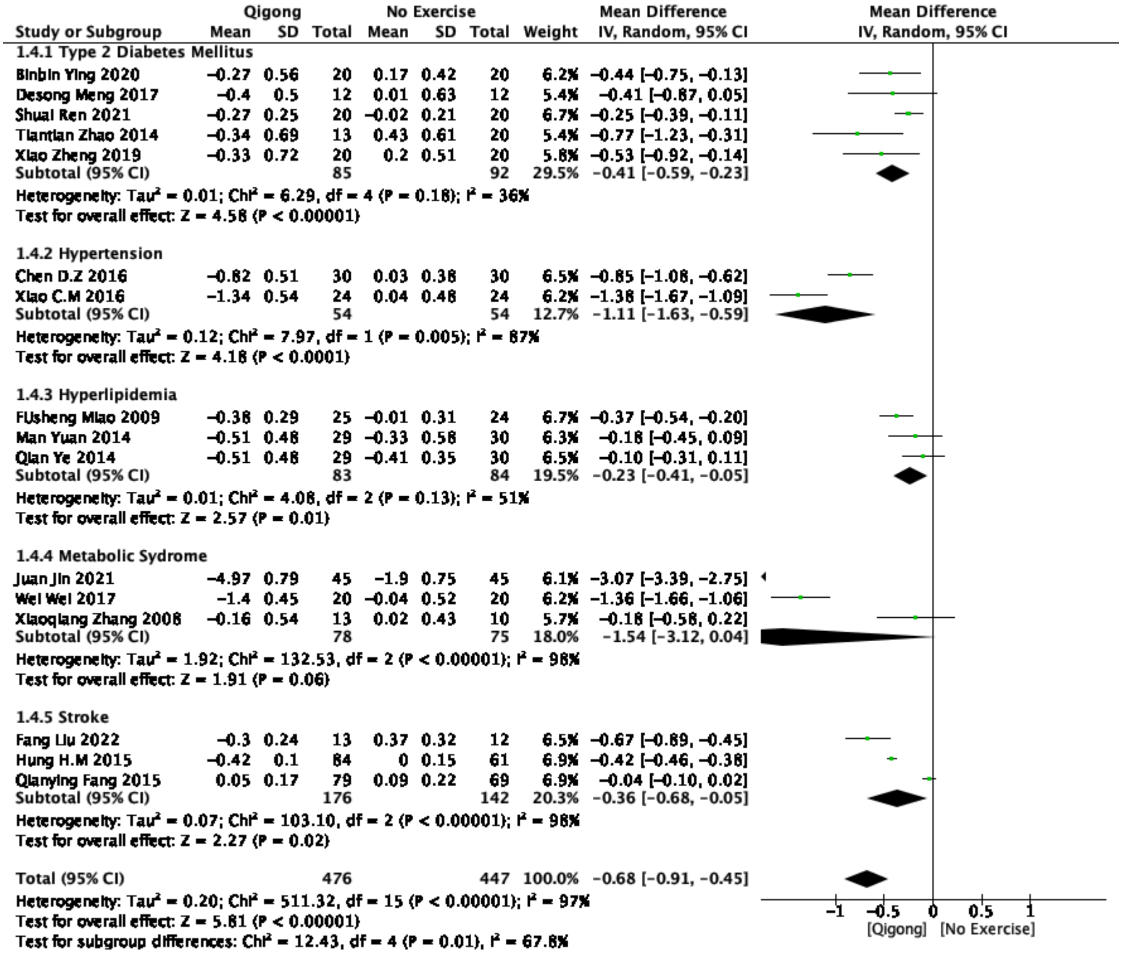


Figure 6. *The meta-analysis for comparing LDL-C between the qigong and no exercise group*

Qigong versus Other ExerciseTotal

Cholesterol

A total of 4 studies (n=264) regarding TC indicators were found to have excessive heterogeneity after combining data (P<0.00001; I2=87%), and meta-analysis was performed using a random effects model[24 26 30 31]. Subsequently, sensitivity analysis revealed that the data from the study by Liang [26] were the main reason for excessive heterogeneity. After excluding this item (Figure 7), there was no statistically significant difference between the Qigong and non-exercise groups (MD= 0.05, 95% CI [-0.11, 0.20], P=0.55).

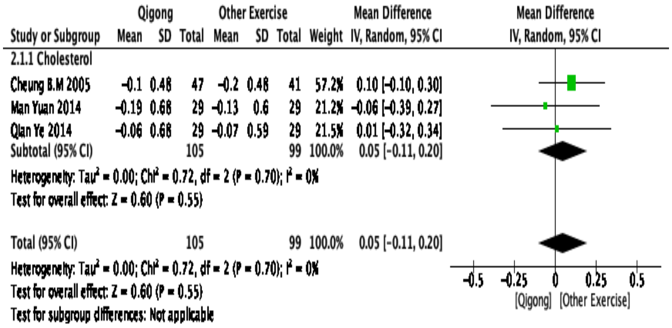


Figure 7. *The meta-analysis for comparing TC between the qigong and other exercise group*

Triglycerides

Triglycerides data were obtained from 4 studies(n=264)[24 26 30 31], Combining the data revealed relatively high heterogeneity(P<0.0001; I2=88%), a random effects model was used for data analysis. A sensitivity analysis of the data was performed to exclude data that triggered high heterogeneity[26]. Finally, Figure 8 shows the data collected from 3 studies (n=204), which showed no significant differences between the qigong and other exercise groups. (MD= -0.00, 95% CI [-0.11,0.10], P=0.95).

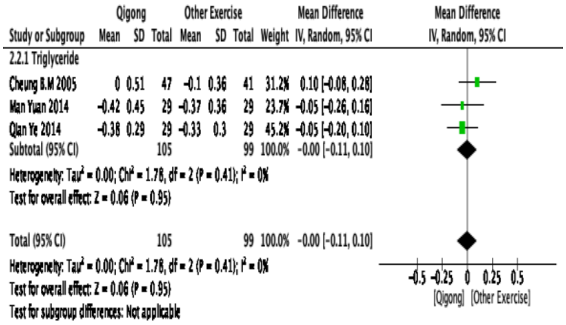


Figure 8. *The meta-analysis for comparing TG between the qigong and other exercise group*

High-density lipoprotein Cholesterol

A total of four studies (n=263) reported data on HDL-C[24 26 30 31]. After combining the data showed high heterogeneity (P<0.00001; I2=94%), and a meta-analysis was performed using a random-effects model. Excluding the 2 main sources of heterogeneity [24 26], the results in Figure 9 show no significant differences between the qigong and non-exercise groups(MD=0.07,95% CI [0.00, 0.14], p=0.04).

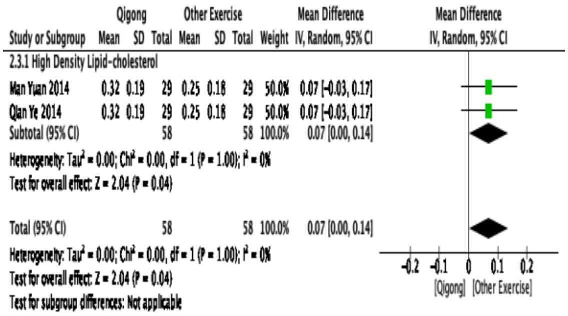


Figure 9. *The meta-analysis for comparing HDL between the qigong and other exercise group*

Low-density lipoprotein Cholesterol

A total of four studies (n=264) reported data of LDL-C. Merging the data showed a high level of heterogeneity(P<0.00001; I2=89%).Therefore, a random-effects model was used for the meta-analysis[24 26 30 31]. Sensitivity analysis excluded studies that caused excessive heterogeneity [26]. Finally, figure 10 indicates that after combining data from 3 studies (n=204), qigong did not reduce LDL-C levels in patients with CVD(MD= -0.01, 95% CI [-0.26,0.24], P = 0.95).

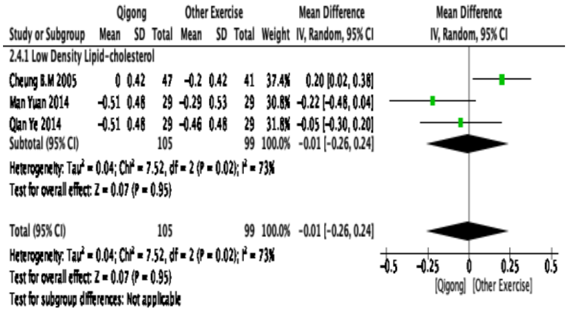


Figure 10. *The meta-analysis for comparing HDL between the qigong and other exercise group*

Publication Bias Evaluation

Publication bias Evaluation between Qigong and Non-exercise group.

Blood lipids were analyzed using funnel plots in the qigong and non-exercise groups. A total of 17 studies were included. The results showed that the included studies were asymmetrically distributed in the funnel plot, and heterogeneity existed in seven studies, suggesting a possible risk of publication bias in the qigong and non-exercise groups.

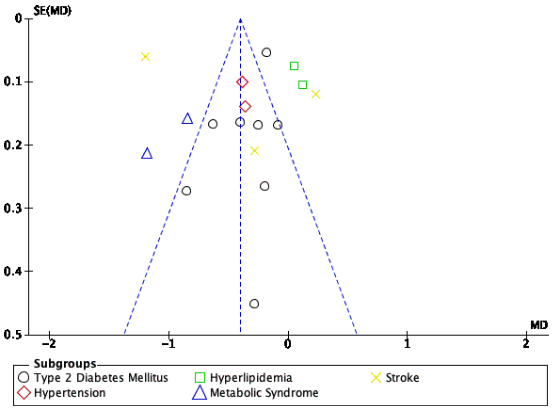
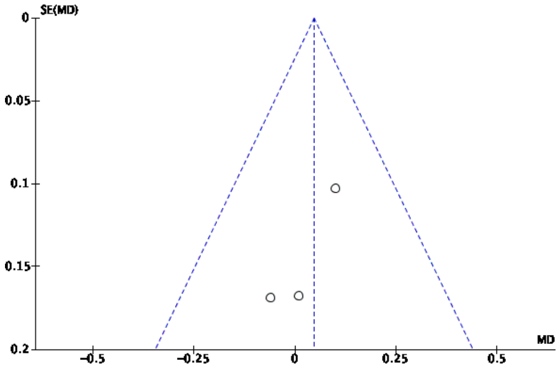


Figure 11. *The blood lipids in the qigong and no exercise group of the funnel plots.*

Publication bias Evaluation between Qigong and Other exercise group. Funnel plot analysis of the risk of publication bias in the qigong group and other exercise groups. A total of 3 studies were included. The results showed too few included studies and an asymmetric distribution. There is a possible risk of publication bias in the comparison of qigong and other exercise groups.



4. Discussion

There are many studies on qigong as an intervention, but almost no studies on patients with CVD. The results of several studies have shown that qigong is effective in reducing TC, TG, and LDL-C and promoting HDL-C[10 13 14 26 29 34], with TC and LDL-C being the most significant[9] and HDL-C showing a tendency to increase[10]. According to the results of this study, qigong had a positive effect on improving TG and LDL-C but no significant effect on HDL-C in patients with CVD compared to the no exercise group, which is consistent with Zou's study [41]. There was no statistical significance of qigong compared with other exercises. Qigong as a type of aerobic exercise, was similar to other exercises. However, the gentle and slow exercise forms of qigong are particularly suitable for patients with cardiovascular diseases.

The improvement in blood lipid levels is closely related to the type of qigong, and the effect of different qigong on blood lipids is not the same. Sun conducted a systematic evaluation based on the effects of various qigong on blood lipids in middle-aged and elderly people[12], and the results showed that the effects of different qigong on blood lipids also varied, but had significant effects on at least three lipids indicators. The fact that we did not subdivide the different types of qigong in this analysis could be the reason for heterogeneity. Patients with different types of CVD showed different results, and by comparison, patients with hypertension and hyperlipidemia showed significant improvement in TC, probably because qigong also has a lowering effect on blood pressure [42]. The accuracy of the results could not be determined in hyperlipidemic patients because only two studies were included and heterogeneity was high.

In addition, this study has some limitations. First, only Chinese/English literature was included, and although the database was searched as comprehensively as possible, there were fewer randomized controlled trials that met the criteria, which may limit the generalization of the results of the analysis. Second, the included studies had different monitoring times, and no correlation analysis of the monitoring times was performed. Third, most studies did not explicitly report randomized means and blinded assessments, and the risk of ambiguity was high. Fourth, the results of the studies may be compromised by the high heterogeneity in the analysis process, which can only be analyzed using a random-effects model.

5. Conclusion

In conclusion, qigong has a significant positive effect on lipid levels in patients with cardiovascular disease. The most significant effects were seen in TG and LDL-C levels, and even though the improvement in TC and HDL-C indices was not significant, a trend toward improvement was still considered. Owing to the limitations of the present study, definitive analytical results may require further confirmation by additional high-quality studies.

Abbreviations

RCT: randomized controlled trial; CVD: cardiovascular disease; TC: total cholesterol; TG: triglycerides; HDL-C: high-density lipoprotein cholesterol; LDL-C: low-density lipoprotein cholesterol; MD: mean difference; 95%CI: 95% confidence interval; WHO: World Health Organization.

Funding Sources

Funding information is not available.

Data Availability Statement

The datasets generated and/or analyzed during the current study are available from the first author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Author’s Contributions

Chao proposed the project and registered with its research proposal. Chao and yang conducted the literature search and data extraction; Ding and Chao performed the data analysis; Chao drafted the draft; Tengku made further changes and comments on the draft; and all authors confirmed the final manuscript.

Acknowledgments

No applicable.

References

[1] WHO. Cardiovascular diseases. Secondary Cardiovascular diseases 2022. https://www.who.int/zh/health-topics/cardiovascular-diseases#tab=tab_1.

[2] Hu D, Wang J. Current status of dyslipidemia prevention and treatment in China. Chinese Journal of Practical Internal Medicine 2009;29(01):2-4

[3] Ke Y, Chen H. Advances in Research on Fitness Qigong Yi Jin Jing and Cardiovascular Diseases. Massage and Rehabilitation Medicine 2021;12(06):43-45 doi: 10.19787/j.issn.1008-1879.2021.06.016[published Online First: Epub Date]|.

[4] Yuan J, Jiang B. Research on the preventive and therapeutic effects of fitness qigong on cardiovascular diseases in the elderly. Curriculum Education Research 2015(05):242

[5] Ji Y. Fitness Qigong social sports instructor training materials: People's Sports Publishing House, 2007.

[6] 6. Liu Y. Fitness Qigong research in the last decade of the evolution of scientific research trends and law visualization research [Master]. Beijing Sports University, 2019.

[7] Adults JCotDoGftPaToDiC. Guidelines for the prevention and treatment of dyslipidemia in adults in China: People's Health Publishing House, 2008.

[8] wang S. The effects of fitness qigong dai dai and six-character exercise on atherosclerosis, blood lipids and body composition in middle-aged and elderly men aged 55-65 years [Master]. Xi'an Sports Institute, 2018.

[9] Wang X, Feng L. Meta-analysis of the effect of Fitness Qigong Five Animal Play on blood lipids in adults. Chinese Journal of Sports Medicine 2017;36(02):156-63+82 doi: 10.16038/j.1000-6710.2017.02.011[published Online First: Epub Date]|.

[10] Sun J, Li Q, Sun Y. A study on the intervention effect of practicing fitness qigong for six months on middle-aged and elderly patients with hyperlipidemia. Stationery and Technology 2021(07):9-10

[11] Liu F, Yu L, Cheng X, et al. Effect of Liuzijue on cognitive function and blood lipid levels in patients with post-stroke cognitive impairment. Chinese Healing Medicine 2022;31(02):119-23 doi: 10.13517/j.cnki.ccm.2022.02.003[published Online First: Epub Date]|.

[12] Sun M, Zeng F. Meta-analysis based on the effects of various fitness qigong gong methods on blood lipids in middle-aged and elderly people. Liaoning Sports Technology 2018;40(02):70-78 doi: 10.13940/j.cnki.lntykj.2018.02.018[published Online First: Epub Date]|.

[13] Zhang B, Wang Q, Dong L, et al. Meta-analysis of the effect of Chinese fitness qigong Badaanjin on blood lipids in middle-aged and elderly people. Southwest Military Medical 2019;21(03):241-46

[14] Li X, Gao L. Effects of fitness qigong intervention on blood glucose, blood lipids and their self-rated health in the elderly. Journal of Xi'an Sports College 2019;36(01):82-87 doi: 10.16063/j.cnki.issn1001-747x.2019.01.012[published Online First: Epub Date]|.

[15] S HJG. Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0. Secondary Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0. www.cochrane-handbook.com.

[16] L. T, B. S, Z. R. Effect of fitness qigong eight-danjin on related indexes in obese middle-aged women with diabetes mellitus. Chinese Journal of Applied Physiology 2018;34(01):19-22

[17] M. D. Experimental study on the efficacy of traditional fitness gong method, Yi Jin Jing, in intervening type II diabetes mellitus [Master]. Guangxi Normal University, 2017.

[18] R. S. Study on the effects of fitness qigong eight-danjin on glucolipid metabolism and anxiety and depression in prediabetic people [Master]. Liaoning Normal University, 2021.

[19] W. Y. A study on the effect of Ba Duan Jin on intestinal flora and insulin resistance in pre-diabetic patients [Master]. Chengdu University of Chinese Medicine, 2020.

[20] Y. B. A study on the intervention effect of the new guiding gong method on middle-aged and elderly patients with type II diabetes mellitus [Master]. Shanghai Sports College, 2020.

[21] Z. T. Study on the effect of fitness qigong-Mawangdui guiding exercises on the adjuvant therapy of type 2 diabetic patients [Master]. Shanghai Sports College, 2014.

[22] Z. X. Study on the effect of three elimination and nine treatment gong to improve blood glucose and blood lipid in elderly type 2 diabetic patients [Master]. Beijing Sports University, 2019.

[23] Chen DZ. Effect of health qigong mawangdui daoyinshu on blood pressuree of individuals with essencial hypertension. Journal of the American Geriatrics Society 2016;64(7):1513-15 doi: 10.1111/jgs.14218[published Online First: Epub Date]|.

[24] Cheung BM, Lo JL, Fong DY, et al. Randomised controlled trial of qigong in the treatment of mild essential hypertension. Journal of human hypertension 2005;19(9):697-704 doi: 10.1038/sj.jhh.1001884[published Online First: Epub Date]|.

[25] L. X. A study on the effect of Badaanjin on the intervention of patients with grade 1 and 2 essential hypertension [Master]. Guangxi Normal University, 2014.

[26] L. Y, L. S, H. C, W. H, P. Y. Effects of Badaanjin exercise intervention on blood pressure and blood lipids in patients with essential hypertension. Henan Chinese Medicine 2014;34(12):2380-81

[27] Xiao CM, Yang YQ, Zhuang YC. Effect of health qigong ba duan jin on blood pressure of individuals with essential hypertension. Journal of the American Geriatrics Society 2016;64(1):211-13 doi: 10.1111/jgs.13913[published Online First: Epub Date]|.

[28] L. D. A study on the health intervention of Baduanjin for people with hypertriglyceridemia, phlegm and dampness [Master]. Chinese Academy of Traditional Chinese Medicine, 2016.

[29] M. F, L. X, L. Y, W. X. Effects of fitness qigong Badaanjin on lipid and lipoprotein metabolism in patients with hyperlipidemia. Journal of Shandong Institute of Sports 2009;25(10):46-48

[30] Y. M. A preliminary investigation on the effect of fitness qigong-easthijing on blood lipids in patients with hyperlipidemia and the mechanism [Master]. Nanjing University of Chinese Medicine, 2014.

[31] Y. Q. A clinical study of Yi Jin Jing intervention for hyperlipidemia in middle-aged and elderly people [Master]. Nanjing University of Chinese Medicine, 2014.

[32] Y. Y. Effect of fitness qigong-five-animal play on cell adhesion molecules and blood lipid levels in patients with hyperlipidemia. Journal of Liaoning Normal University (Natural Science Edition) 2009;32(03):356-58

[33] Ch. X. Experimental study on the intervention of fitness qigong on metabolic syndrome in the elderly. Journal of Longdong College 2021;32(02):114-17

[34] J. J. A study on the effect of fitness qigong eight-danjin on metabolic syndrome. Journal of Guangzhou University of Chinese Medicine 2021;38(7)

[35] W. W. A study on the effect of Ba Duan Jin exercises on middle-aged male patients with metabolic syndrome. Contemporary Sports Technology 2017;7(28):192-93

[36] Z. X. Effect of fitness qigong-Baduanjin on indicators related to metabolic syndrome in overweight or obese middle-aged women [Master]. Beijing Sports University, 2008.

[37] F. Q. A randomized controlled study on the effect of eight-danjin exercises on risk factors in elderly people at high risk of stroke in the community [Master]. Fujian University of Chinese Medicine, 2015.

[38] Hung HM, Chen KM. [Scientific and holistic therapy perspectives on Qigong practice for elders with cardiovascular disease risk factors]. Hu li za zhi The journal of nursing 2009;56(1):73-8

[39] L. F, Y. L, Ch. X, et al. Effect of Liuzijue on cognitive function and blood lipid levels in patients with post-stroke cognitive impairment. Chinese Healing Medicine 2022;31(02):119-23

[40] S. A, W. Y, H. J. A study on the reduction of cardiovascular disease incidence with Five Animal Exercise. Sports Science Research 2015;19(06):38-40
[41] Zou L, Zhang Y, Sasaki JE, et al. Wuqinxi Qigong as an Alternative Exercise for Improving Risk Factors Associated with Metabolic Syndrome: A Meta-Analysis of Randomized Controlled Trials. International Journal of Environmental Research and Public Health 2019;16(8):1396
[42] Xie W, Su JH, Wang J. Changes of blood pressure, serum inflammatory factors and endothelin levels in patients with hypertension under rehabilitative aerobic exercise. J Biol Regul Homeost Agents 2019;33(2):531-36